Spruce Budworm

United States Department of Agriculture

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SPRUCE BUDWORM

Spruce and fir forests throughout North America are subjected to annual growth losses and tree mortality due to infestations of the spruce budworm, *Choristoneura* spp. In Alaska, significant budworm damage was detected in 1978 on white spruce in many residential and park areas of Anchorage. Subsequent surveys revealed low levels of budworm activity from the Kenai Peninsula to Fairbanks. Sitka spruce forests in southeast Alaska have also been impacted.

Overall, there is little budworm damage to Alaska's spruce forests. In urban settings, however, the spruce budworm appears to be more damaging in terms of affecting host vigor and aesthetics. This brochure will familiarize homeowners with spruce budworm damage, its life history, and guidelines to help reduce damage.

DAMAGE: In Alaska, the spruce budworm is primarily a pest of white and Sitka spruce. Damage occurs when budworm caterpillars (larvae) eat the buds and needles of spruce, causing the foliage to turn reddish-brown. In most cases, feeding is restricted to the new growth, but during heavy infestations, older needles can also be affected (Figure 1). Consecutive years of heavy feeding can result in complete defoliation and fewer buds, which can cause further damage. This damage is described below.

- **Top-killing** can result in forked or multiple leaders, affecting the merchantable tree height in forest situations and tree aesthetics in urban settings.

Figure 1. Moderately defoliated white spruce.

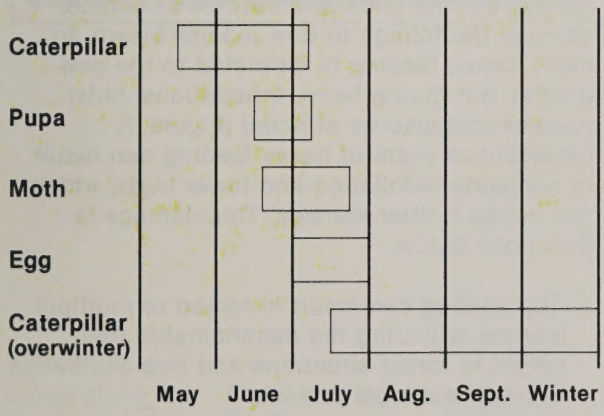
- **Growth** is reduced, depending on the amount of defoliation. In urban settings this is of little concern, unless rapid growth is desired for overall landscape balance. Under forest conditions, however, intense defoliation can cause a significant reduction in wood production in merchantable forest stands.

- **Tree Death** rarely occurs in Alaska from budworm damage. Potential tree mortality does exist in urban settings though, where spruce are under greater stress and subsequently are less healthy and vigorous. This often occurs in new construction areas where trees are mechanically damaged and soil is compacted or placed on top of root systems in excess amounts.

LIFE HISTORY: The adult budworm is a medium sized moth about ½ inch long. There is a variety of wing coloration ranging from orange-brown to grey (Figure 2). Adults emerge from their pupal cases among the foliage from mid-June to mid-July (Figure 3). Adults are active throughout the late afternoon and early evening. The moths can be carried up to ten miles by normal winds or hundreds of miles by storm fronts. The female lays greenish eggs in a shingled mass on spruce needles in the area of previous caterpillar feeding sites. The young pale-cream caterpillars emerge in about ten days. The young caterpillars do not feed but spin silken shelters in twig and bark cervices where they remain until the following spring. About mid-May the caterpillars bore into new buds and feed on the new growth. Full grown caterpillars are about an inch long with dark brown heads and bodies with prominent light colored spots along the back (Figure 4). From

Figure 2. Budworm adult (common color pattern).

Figure 3. Pupal case.



mid- to late June mature caterpillars transform into pupae (transitional stage of about ten days from caterpillar to moth). Pupae are reddish-brown to black in color, about ½ inch long, and are normally found within the webbing previously formed by feeding caterpillars.

GUIDELINES FOR REDUCING DAMAGE:

Spruce budworm suppression is not presently necessary on forested land. In urban settings, however, the budworm can cause more damage and homeowners may need to select one of the following alternatives.

- If budworm feeding is low to moderate and spruce trees are vigorous, damage is minimal. The use of pesticides is usually not necessary, but the following steps should be taken:

  1. Be careful and avoid damaging the trunk, injuring the roots, altering the drainage patterns, or severely compacting the soil.

  2. Spring fertilization helps promote tree vigor. The USDA Cooperative Extension Service recommends one to two pounds of fertilizer per inch of tree diameter. Any complete lawn or garden fertilizer high in phosphorus is adequate. Apply by making a series of holes, 8–10 inches deep around the tree starting two feet from the trunk and extending a few feet beyond the dripline. Fertilizing should begin in the spring and continue through the summer, then be discontinued prior to fall dormancy. A feeding program may not be necessary every year. Fertilizer uptake, soil type, rainfall, weather, and grass cover will all determine the time of reapplication.

• If ornamental spruce trees show signs of heavy budworm feeding for two or more consecutive years, chemical treatment may be warranted. Insecticides should be applied from mid-May to early June when budworms are beginning to feed on new growth. The young caterpillars are susceptible to chemical treatment at this time and damage can be kept to a minimum. There are a number of insecticides containing Carbaryl, Dimethoate, and Malathion which are registered by the Environmental Protection Agency for budworm suppression.

Figure 4. Budworm larvae.

Spruce Budworm, by Edward Holsten, Entomologist, Forest Pest Management, State and Private Forestry, USDA Forest Service, Alaska Region.

Additional information on this insect and control alternatives can be obtained from your local USDA Cooperative Extension Service office, Alaska State Forestry office, or from:

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CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for disposal of surplus pesticides and pesticide containers. Mention of a pesticide in this publication does not constitute a recommendation for use by the USDA, nor does it imply registration of a product under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. Mention of a proprietary product does not constitute an endorsement by the USDA.

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